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Unlocking our low-emission future:

29 November 2017

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29 November 2017

Motu Presentation

Catherine Leining on low-emission pathways

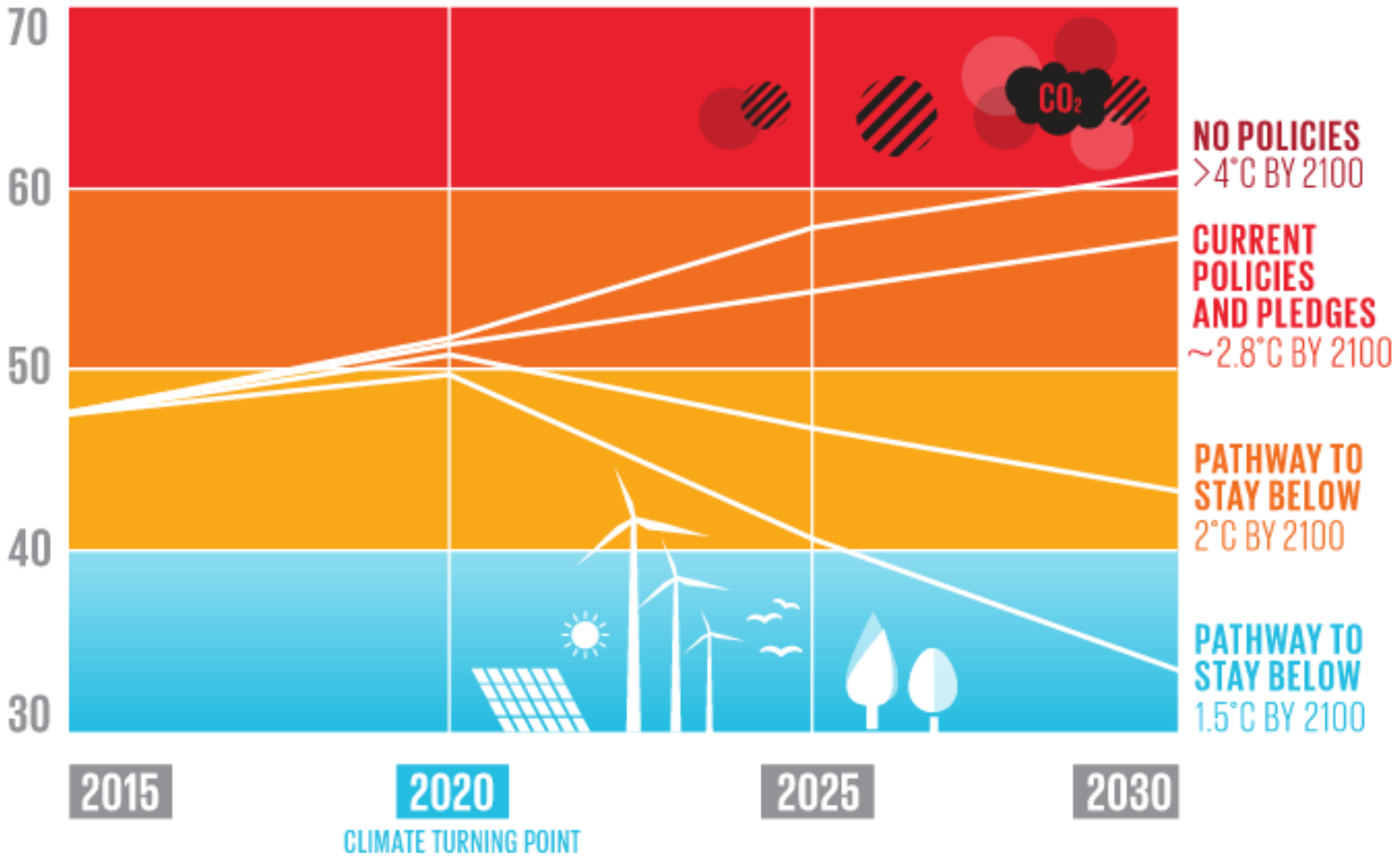
Funders:

Topics

1. Mitigation needs
2. NZ's low-emission opportunities
3. Pathway risks
4. Implications for targets
5. Shaping the solution space

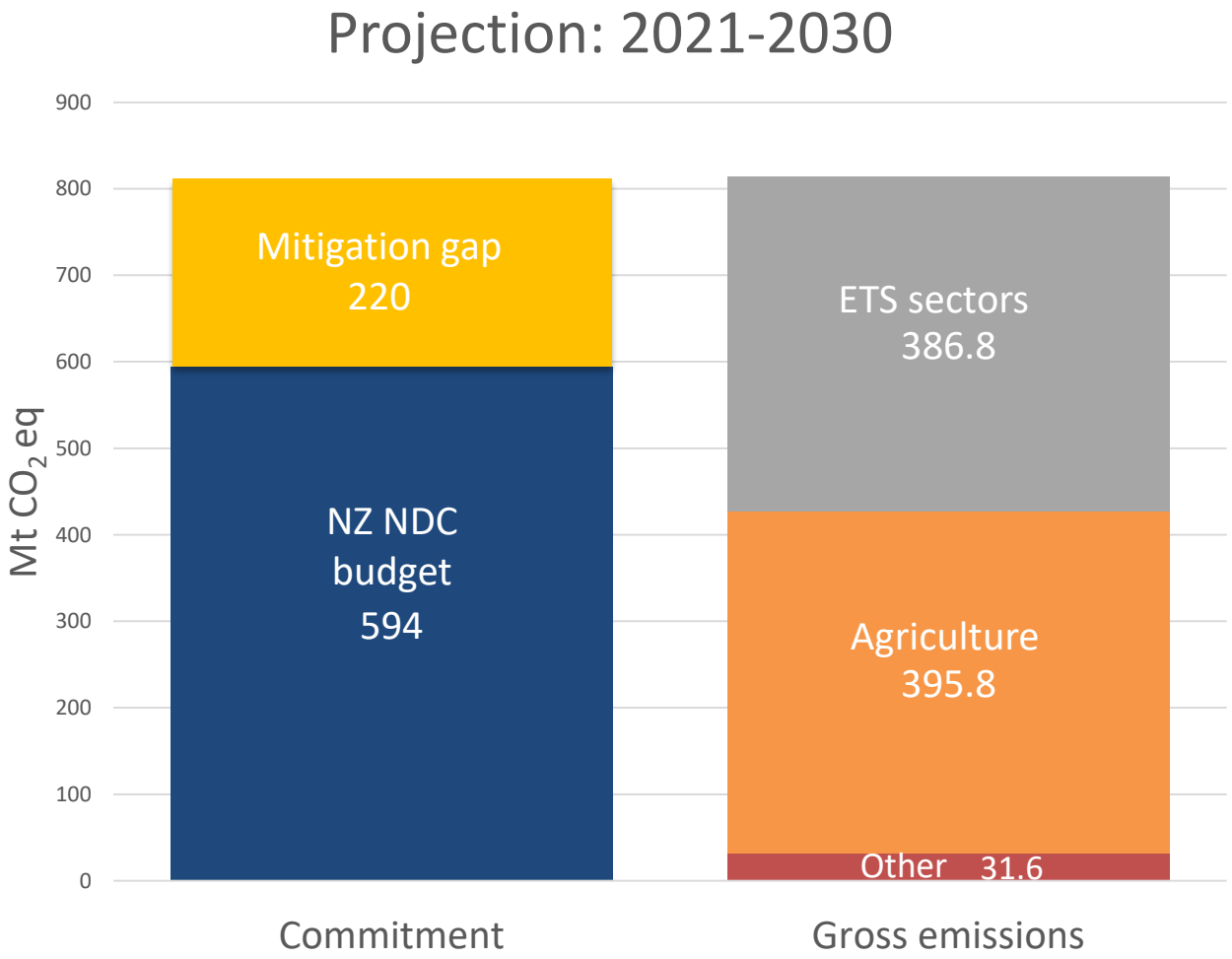
Disclaimer: This presentation does not necessarily reflect the views of or endorsement by Low-Emission Future Dialogue participants, their organisations, or programme funders.

Bending the global curve



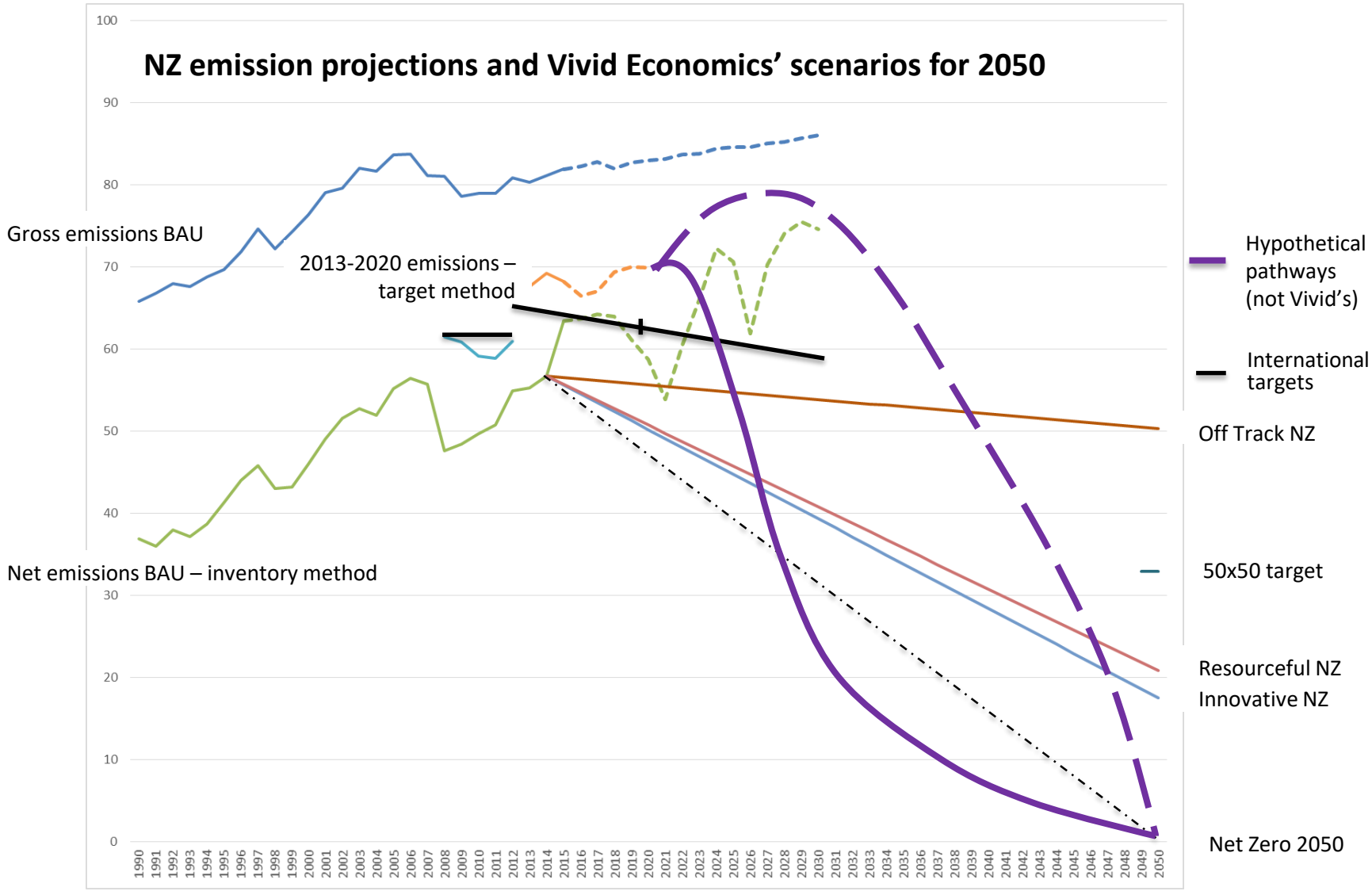
Source: Carbon Tracker Initiative et al. (2017). *2020: The Climate Turning Point*. Mission 2020.

We face a mitigation gap to 2030…



Source: MfE (2017). *The NZ ETS and New Zealand's Provisional Carbon Budget for 2021-2030.*

…and are not on track for 2050



Note that actual emissions and future targets are based on the 1990-2014 National GHG Inventory.
Source: Adapted from Vivid Economics (2017). *Net Zero in New Zealand. Report commissioned by GLOBE-NZ.*

Climate policy framework

Past objective: Least-cost compliance with modest international responsibility targets

= *Incremental change*

New context: Joining global decarbonisation

= *Transformational change*

LEF Dialogue process: Backcasting

Bold sector visions for zero net emissions

Sector characteristics supporting the vision:

Balance will vary under different pathway choices

Sector milestones producing the characteristics:

Technology, policy/regulation, business, behaviour

Sector actors and actions producing milestones:

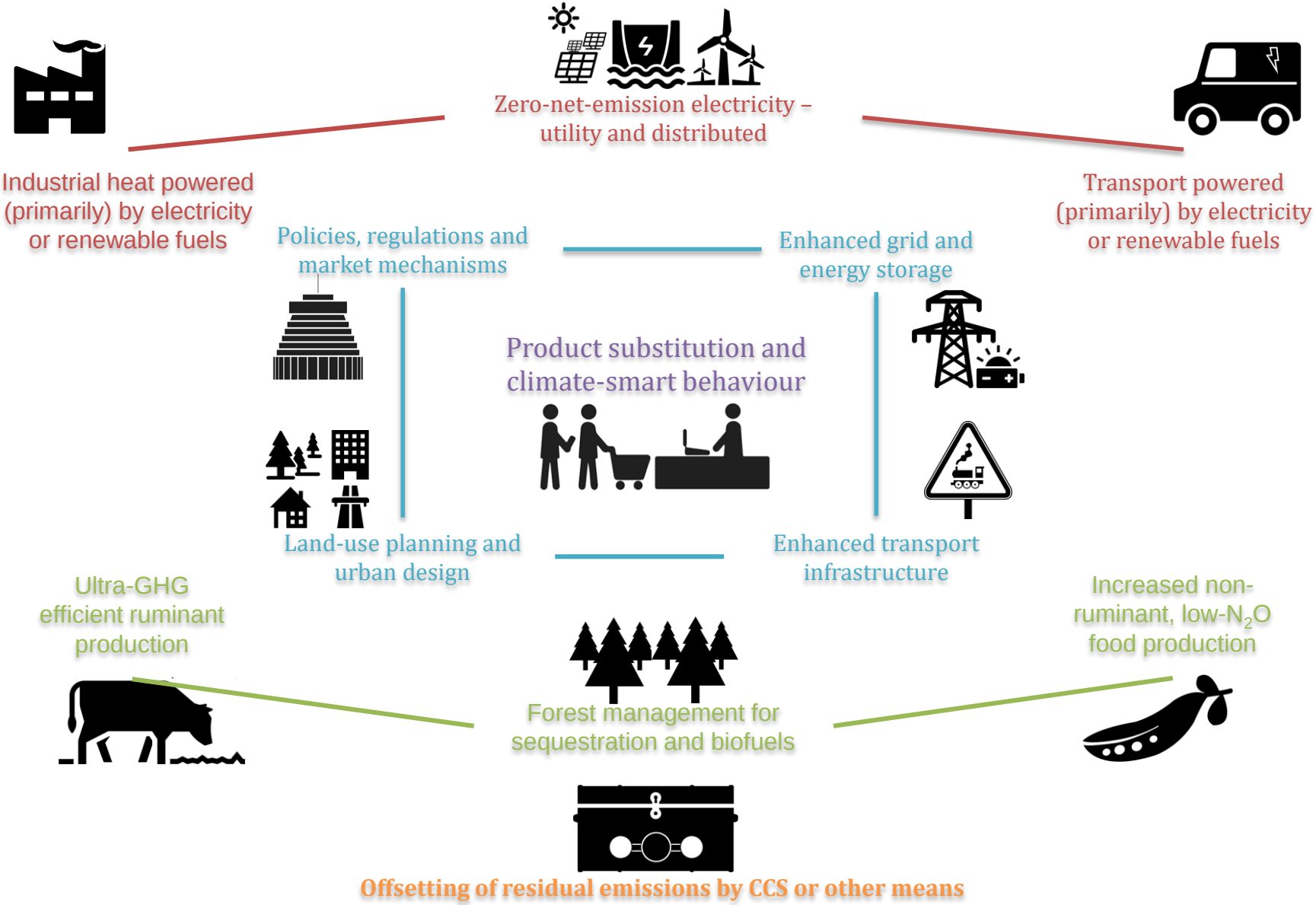
Who made change happen and how did they do it?

A fresh climate narrative

New Zealand is responding to climate change with smart solutions that safeguard our future, enable a thriving low-emission economy, create new opportunities for our communities, and can be shared with other countries.

We are accelerating this transition by decarbonising our stationary energy and transport sectors, improving energy efficiency, making our agricultural production ultra-efficient, enhancing forest sinks, and strengthening partnerships across sectors.

Driving a zero-net-emissions future



Range of possible futures

Stationary energy

Renewable electricity:
utility, distributed

Storage:
hydro lakes, batteries, hydrogen, disruptor

Industrial heat:
electric, renewable, hydrogen, disruptor

Energy efficiency, conservation

Carbon capture and storage

Transport

Transport supply:
vehicle technology, networks, infrastructure

Transport demand:
mode shift, urban planning, culture change, technology change, disruptor

Transport energy:
electricity, biofuel, hydrogen, disruptor

Food production:
ultra-GHG-efficient livestock, zero-CH_4, low-N_2O nutrition
synthetic meat/milk

Reduced food waste

Consumer demand for low-emission food

Agriculture

Pivot points – nodes

Stationary energy

Major gas field discovery

Export carriers for renewable electricity

Aluminium smelter operation

Smart grid technology

Commitment to end energy poverty

Battery technology

Commercially viable CCS

Transport

Sustained change to oil prices ↕

EV costs

Auckland transport investment

Biofuel technology

International shipping supply/ demand/cost

Social norms for vehicle ownership

Rail decommissioning

Lithium shortage

Agriculture

Methane vaccine

Consumer tastes

Tech change/water shortages affect milk powder demand

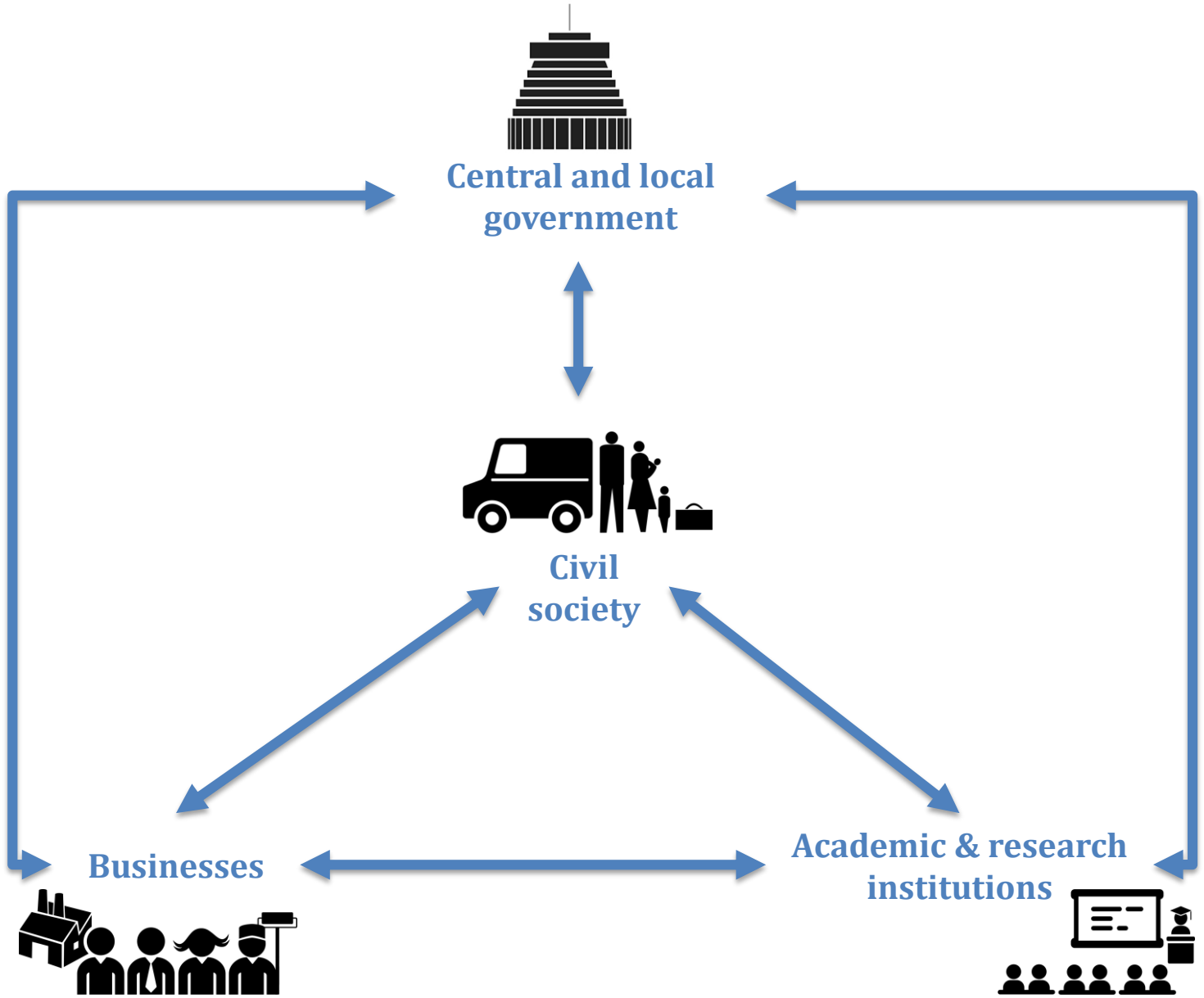
Biomass demand ↕

Fish stock collapse

Pests or disease

Synthetic milk/meat

Who will make change happen?



Sample actions: Industrial heat

- Characteristic: Industrial heat (primarily) is produced with renewable electricity or other non-fossil fuels.
  - Milestone: All boilers are zero-emission
    - Actors and actions
      - Treasury develops policy and legislation for carbon-based fees for commissioning new fossil fuel boilers
      - Finance and Environment Ministers commission officials to calculate the social cost of carbon and ETS trajectories/scenarios
      - Treasury develops fee revenue recycling towards R&D activities
      - Treasury and Motu develop models for tax reform from variable ETS revenue
      - Industrial CEOs assess preferred zero-emission alternatives to industrial heat
      - Industrial CEOs investigate co-location of boilers with biomass and geothermal heat production
      - MBIE creates consortium of CRI and business to research zero emission alternatives to industrial heat
      - MBIE funds contestable research programme funds for low-emission industrial heat production
      - Consumer New Zealand demands higher environmental integrity from emissions-intensive industries
      - Consumer NZ advocates for GHG and water intensity labelling on food

Pathway risks

- Moving too slowly
  - Locking in high emissions
- Moving too quickly
  - Locking out new innovations or generating perverse outcomes
- Disproportionate impacts on businesses and communities
- Uneven supply chain coordination
- Regulatory barriers and inconsistencies
- Politicisation of pathway options
- Uncertainty as an excuse for inaction
  - Climate change science
  - Global response and trade exposure
  - Economic and social impacts of measures

Implications for domestic targets

Targets without pathways are just numbers – and can be scary numbers

Pathway progress will not be linear and will be unpredictable

Re-thinking targets

- Multiple dimensions/indicators across sectors – not just emissions per year
- Linkages to pathways, actions and actors
- Taking responsibility for NZ's whole footprint:
  - Cumulative emissions, consumption emissions, fossil fuel production for export and international transport
  - Important for business as well as government
- Evolution over time

Shaping the solution space

1. Our destination is domestic decarbonisation, and any number of pathways could take us there.
2. This is not just about government; we need many kinds of actions by many kinds of actors.
3. Multidimensional targets can encourage more specific and ambitious actions.
4. We need to balance risks of action and risks of inaction under uncertainty.
5. An adaptive approach is supported by:
   a. Building our capacity
   b. Enabling experimentation
   c. Leaving desirable options open
   d. Avoiding lock-in to high-emission pathways.

Where do we go next?

"In times of change, learners inherit the earth, while the learned find themselves beautifully equipped to deal with a world that no longer exists."

Eric Hoffer

Social writer and philosopher

Key questions for the future:

- What is the case for accelerating domestic transformation?
- What actions are needed now to preserve desirable pathway options, and where can we be confident enough to start making choices?

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Suzi Kerr on models and institutions for adaptive decision making

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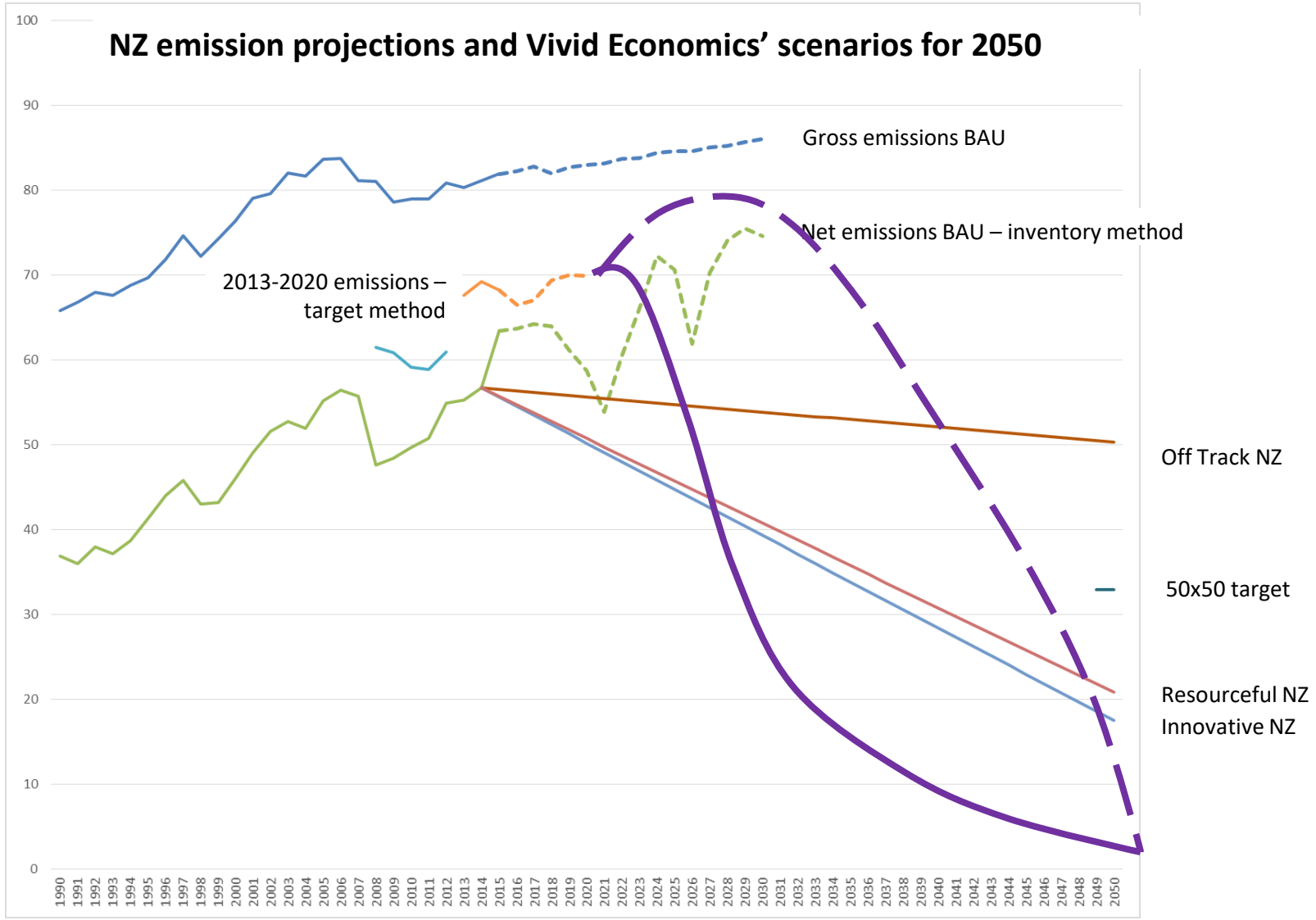
Models and institutions for adaptive decision-making

Suzi Kerr, Motu Senior Fellow and Victoria University Adjunct Professor

Unlocking our low-emission future

Wellington, 29 November, 2017

Transformational change under deep uncertainty



Navigating toward a Net-Zero-Emissions Future

1. Investing over time under uncertainty
   delay, flexibility, options, adoption, adjustment costs
2. Modelling to inform decisions under uncertainty
3. Policy under uncertainty
4. Governance for social decision-making

Transformation can take very different forms

Technology breakthrough

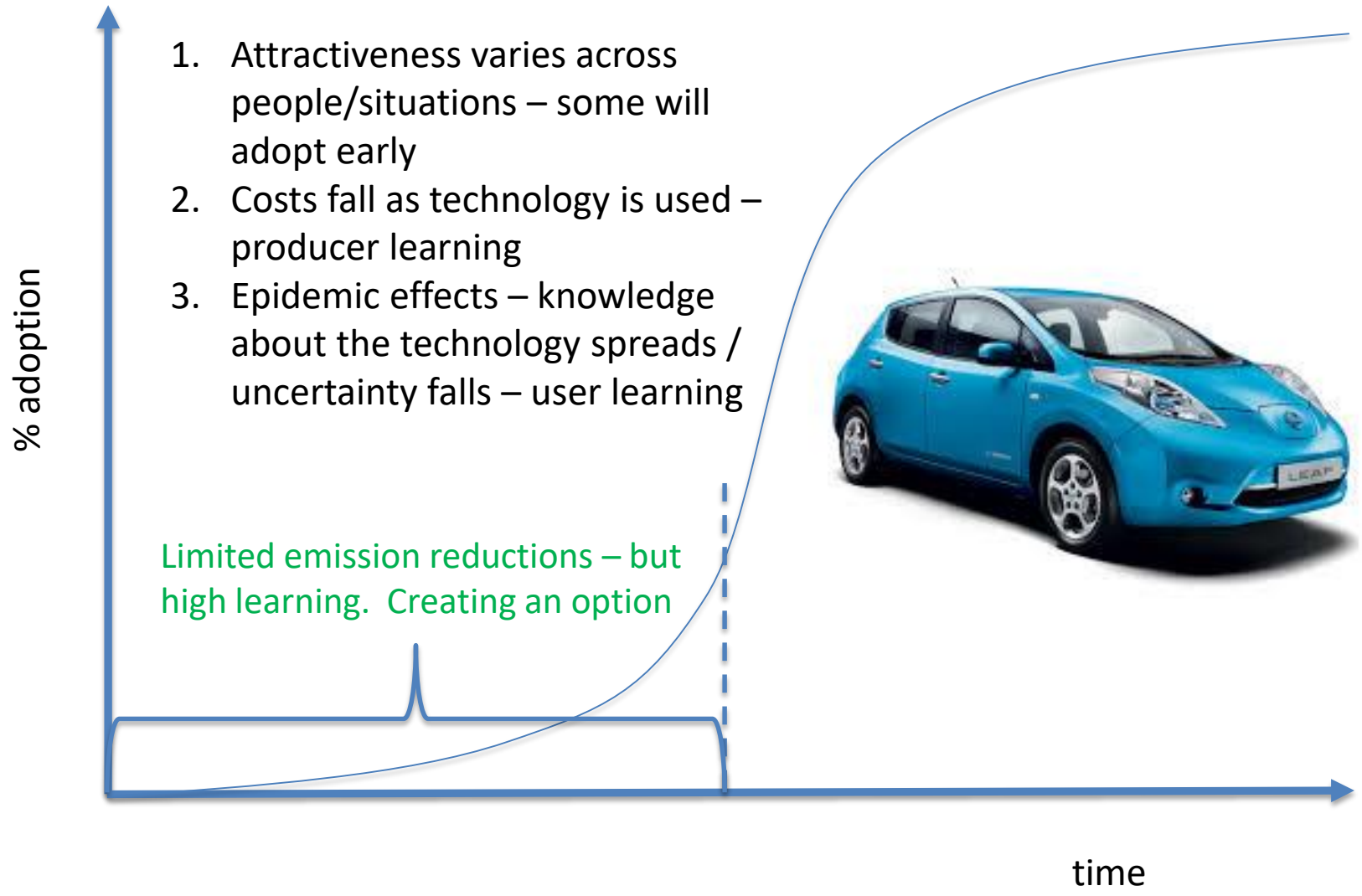
Social breakthrough

How should we invest (or encourage investment) under uncertainty?

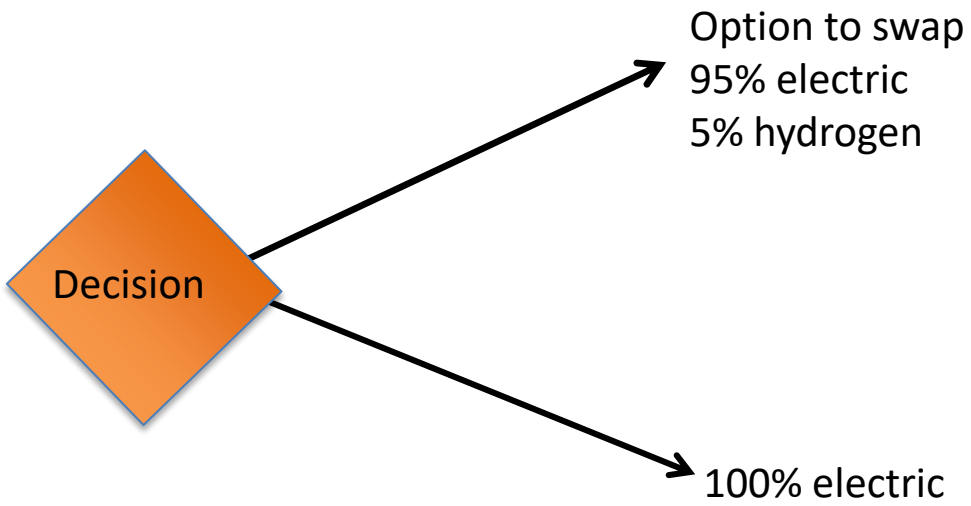
1. Delay investment (in green and brown technologies) if new information is likely to be revealed soon
    - don't replace existing assets as early as you might
2. Invest in shorter-lived or more adaptable options
3. Focus on different type of investment - learning

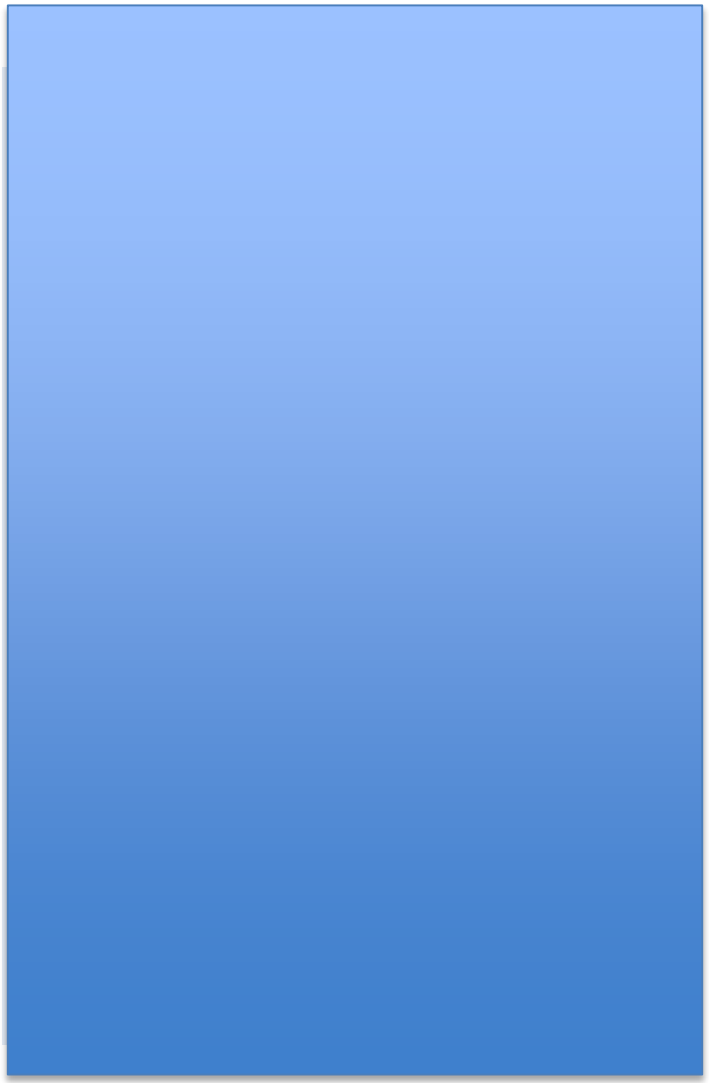
Adoption processes… and time

1. Attractiveness varies across people/situations – some will adopt early
2. Costs fall as technology is used – producer learning
3. Epidemic effects – knowledge about the technology spreads / uncertainty falls – user learning



Buying a real hydrogen transport option





Suppose we think with 99% certainty that electric is best for NZ passenger transport

Overconfidence effect?

Convex costs of adjustment – it's hard to change fast

$

Create options for faster action later, by beginning with lower cost options now

MAC – 10 years

MAC – 30 years

Emission reductions

Modelling under uncertainty

Crystal ball predictions 30 years out are of limited value

- For long-term modelling focus on understanding technical feasibility, sources of mitigation and timing of changes under current options

What should we be doing now to make sure these paths are possible?

Test performance of different short-term strategies under fundamentally different assumptions about technology, targets and prices

Roles for government (under uncertainty)

- Target setting
  - International
  - Domestic – multi-faceted
- ETS settings
- Government's own low-emission investments
  - e.g. infrastructure, car fleet, buildings, education
- Support learning
  - Research and development
    - fundamental research where NZ could be a leader
    - targeted research for adaptation to New Zealand
  - Support for early adoption
- Coordination and facilitation (e.g. regulatory change) of new options implemented by private sector
- Engaging with Iwi around options in the Māori economy
- Phase out of old technologies – e.g. diesel vehicles

Adaptive emissions pricing

Emissions pricing enables low-emission investments and activities to compete

An ETS can provide useful signals to investors and other actors about the value of mitigation at each point in time

Key decisions are cap and price bands – how fast do we push the NZ economy?

Policy driven uncertainty: Policy stability and commitment

All government face incentives to free-ride internationally and to have inconsistent policy over time

Use financial instruments to give government a greater stake in higher emission prices and provide price protection to some key investors

Use strong governance structures to stabilise policy and support social decision making

Supporting social decision-making

Technical advice

- Clusters of research, modelling and policy development initiatives
- Climate change advisory body on technical and economic feasibility of targets, mitigation options and policies

Agreement on goals and strategies

- Clusters of discussions on mitigation goals/strategies within and across sectors
- Large, centralised, representative cross-sector process to deliver consensus
- Political climate leaders group

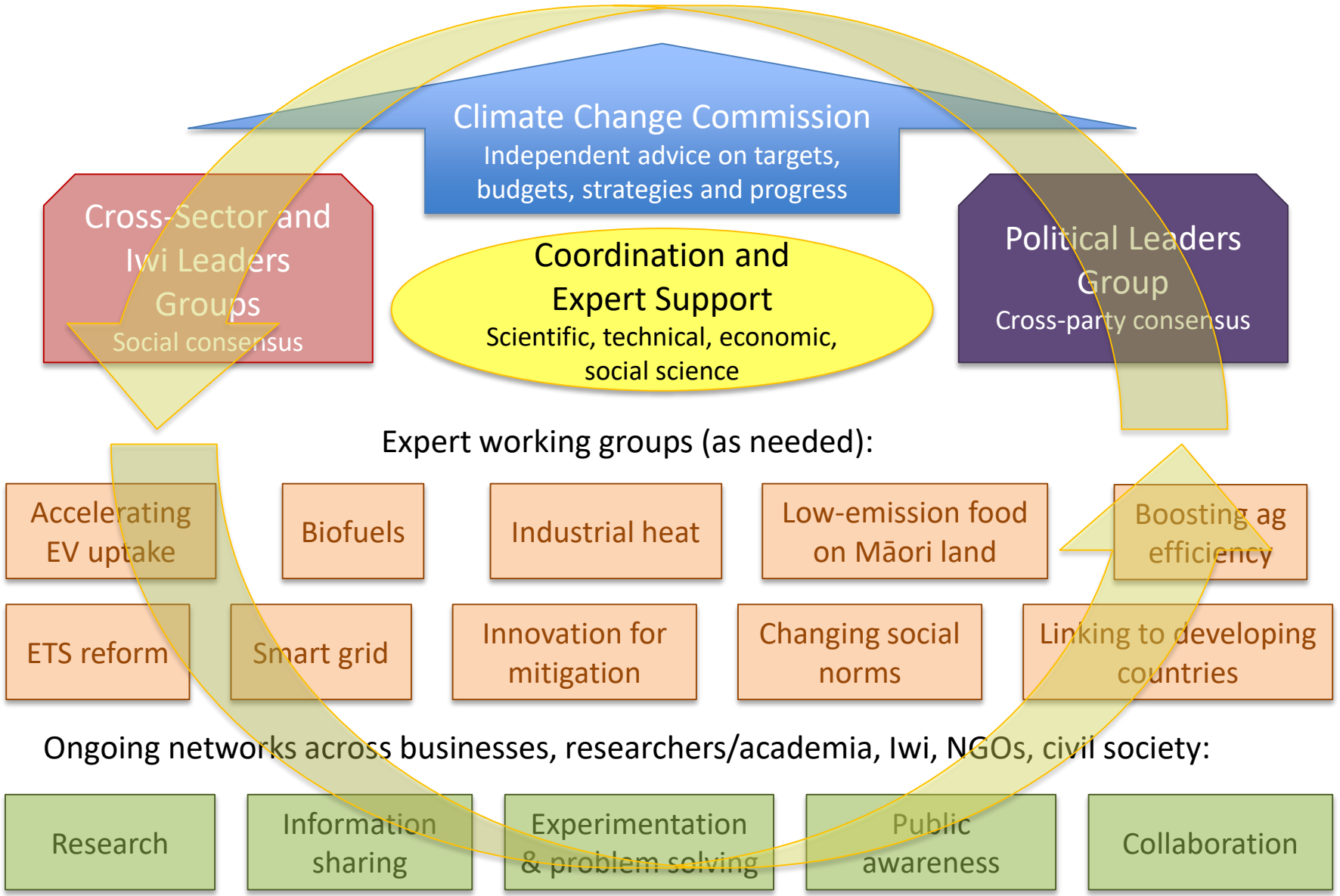
Collaboration on action

- Sector and cross-sector working groups focused on pathway finding, technical problem solving and cooperation
- Education and public awareness campaigns

Ferry?

Flotilla?

Straw man prototype



How do we get to low emissions?

Look back from success

- Generates more ideas, and avoids despair

A multitude of actions and actors

We can't predict the path

- Balance creativity and analysis
- Create, maintain and enhance options

Need for broad, stable, social process

- Transparent and trusted
- Well-informed
- Wide range of perspectives


Through focused intent
Even small countries can be
Forces for great change

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Motu Presentation

Catherine Leining on our journey of today

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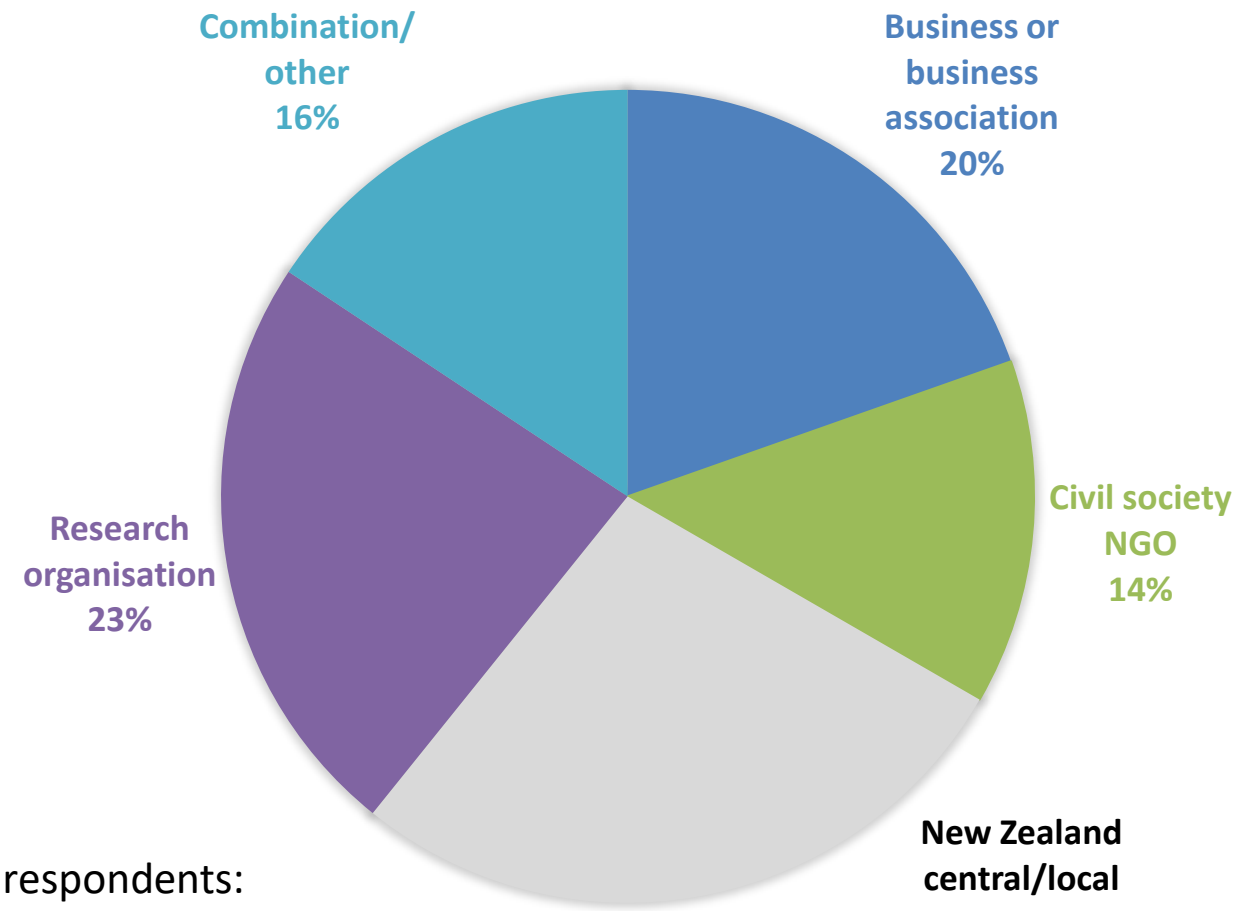
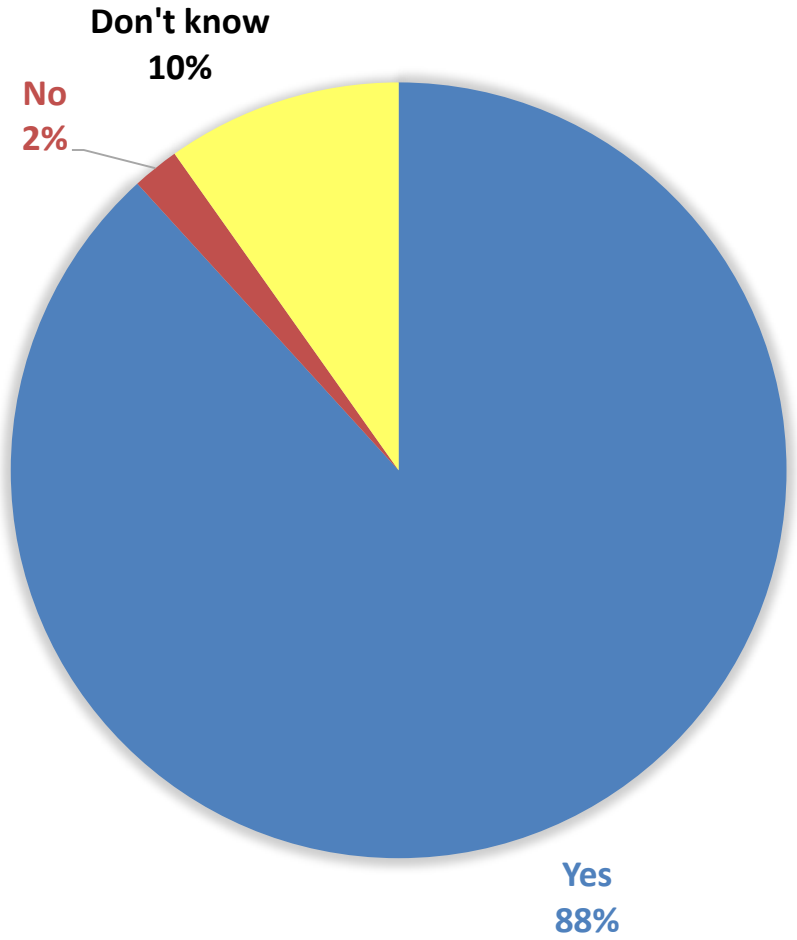
Who responded to our registration survey?



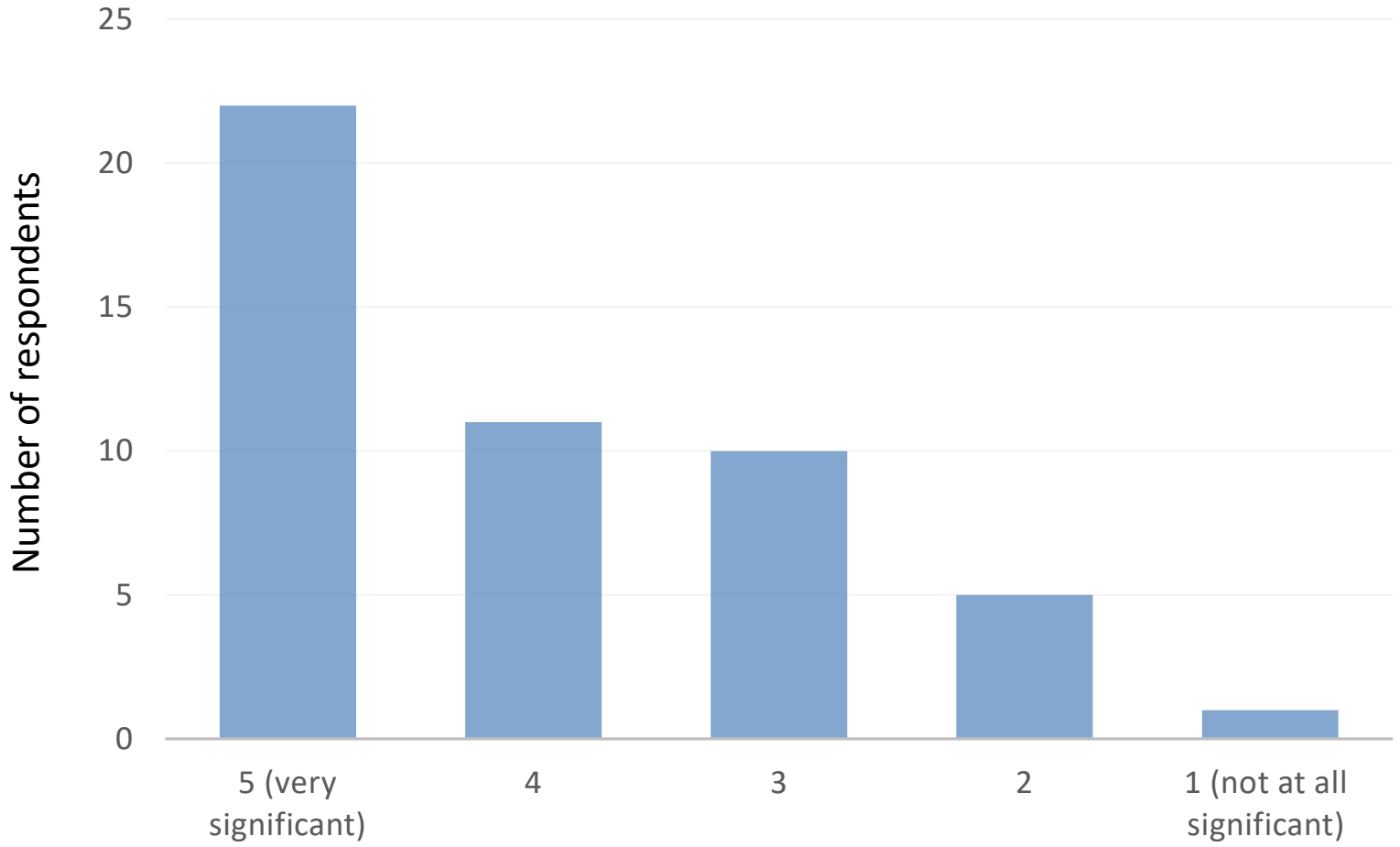
Total respondents: 51

Can NZ achieve a net-zero emission economy sometime this century?



Total respondents:
51

To what extent does climate change mitigation policy influence your organisation's planning and investment decisions?



What action would have the most impact right now?

Government policy	Cross-cutting	Carbon price/ETS	Energy sector	Land sector
• Right central government policies • Public funding of major demonstration technology projects • Independent Commission and Zero Carbon legislation • Sector by sector analysis of mitigation potential after which set a domestic carbon budget • Cross-party agreement on a zero carbon target and long-term framework • Climate change policy certainty	• Building a workforce with robust knowledge of emissions measurement, accounting and mitigation techniques • Fairness means recognising both te Tiriti o Waitangi rights and the needs of NZ's most vulnerable who are also most threatened by climate changes • [For] New Zealand to see climate change both as arguably our biggest global health threat, and an unprecedented opportunity this century for real immediate health gains • Get on with low cost opportunities, more investigation of options and risk reduction for less certain areas	• Effective cap and carbon price in the ETS • *Bring agriculture into the ETS* • Adding a high and rising shadow cost of carbon to government and business investment decisions	• Moving all energy to renewable sources • Industrial heat: Regulations designed to phase out use of coal • Ending fossil fuel exploration, mining, use and export • Electrification of transport • Growing liquid fuels • Phase-in of Feebate system on internal combustion vehicles • Increase active and public modes (taking into account advent of e-bikes) • Freight to rail • Motor vehicle GHG emissions standards	• Forestry: Increase incentives and expand planting • Greater research into cost-effective solutions to reducing agricultural emissions • Land use change • Supporting agricultural innovation • Collaborative planning for a transition in the land-based industry sector • On farm environmental (soil, water, air) monitoring by farmers • *Bring agriculture into the ETS*

Warm thanks to…

Our keynote speaker and panellists

Charles Kolstad, Nick Gerritsen, Manu Caddie, Anders Crofoot, Linda Thompson, Paul Young, Catherine Murupaenga-Ikenn, Barry Barton, Simon Coates, Adrian Macey and Greg Severinsen

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All of you for participating!

For more information

Read our paper on outcomes from the LEF Dialogue, and idea bank
www.motu.org.nz

Try our Household Climate Action Tool
http://insights.nzherald.co.nz/article/climate-action-tool

Subscribe to our blog "New Zealand's Low-Emission Future"
http://low-emission-future.blogspot.co.nz/

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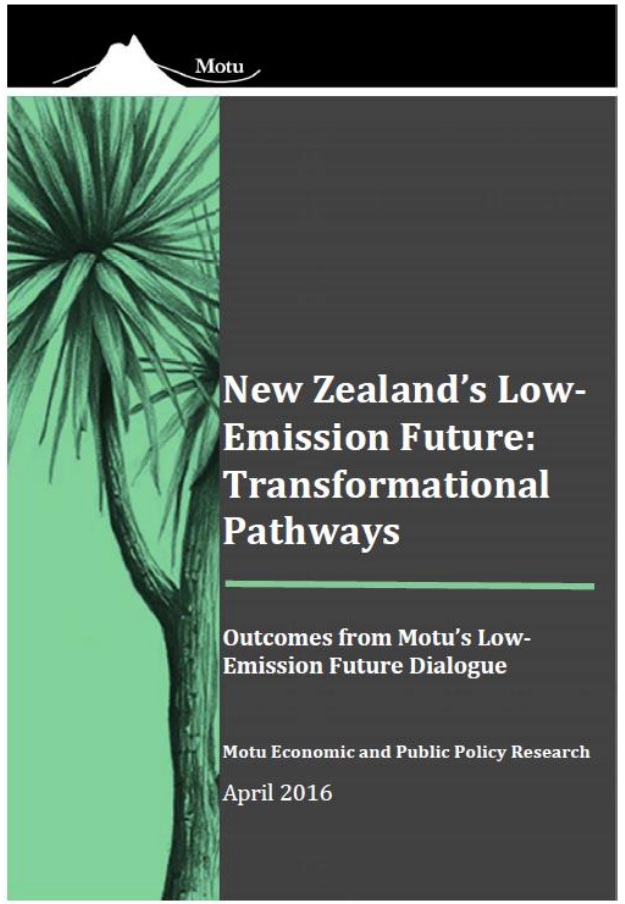

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